SENSOR FUZED WEAPON (SFW)

The CBU-97/B Sensor Fuzed Weapon (SFW) is a 1,000 pound class, unpowered, air-delivered, wide area cluster munition designed to provide multiple kills per pass against armored and support vehicles. The system has been certified on the A-10, B-1, B-2, B-52, F-15, and F-16 and is designed to be compatible with various USN/USMC and NATO aircraft. The weapon has the capability of being delivered in adverse weather conditions, day or night, at various altitudes and airspeeds. SFW consists of a SUU-66/B Tactical Munitions Dispenser (TMD), which houses ten BLU-108/B submunitions. Each submunition contains four projectiles, an orientation and stabilization system, a radar altimeter, and a rocket motor. After spin-up and release from the submunitions, the projectiles scan the area under their flight path with a two-color passive infrared sensor, while a signal processing logic classifies and filters out false targets. Upon detecting a valid target, an electronic pulse detonates an explosive charge, driving an explosively formed penetrator (EFP), an aero-dynamically stable slug, into the target. The SFW will be stored and transported as an all-up-round in the CNU-411A/E container. For typical tactical sorties, a combat load consists of four to six CBU-97/Bs. The SFW can be delivered at low or high altitudes (200 feet above ground level (AGL) to 40,000 feet mean sea level (MSL) (with Wind Corrected Munitions Dispenser (WCMD) tail kit)) and at low through supersonic speeds (250-650 knots). The SFW program is closely related to the WCMD and Joint Standoff Weapon (JSOW) Programs. Retrofit of SFW with WCMD tail kits began in April 2001. All SFWs will be retrofitted with the WCMD tail kit and will become CBU-105s. The SFW BLU-108 submunition will be a payload in the JSOW AGM-154B.

BACKGROUND INFORMATION

The SFW program entered full-scale development in 1985, LRIP in March 1992, and full-rate production in June 1996.

The B-LRIP report submitted in May 1996 determined that SFW was only operationally effective when employed at low altitudes using level or shallow angle dive deliveries. SFW was designed for low altitude, direct attack delivery profiles. DESERT STORM experience resulted in an air doctrine favoring high altitude deliveries. The Wind Corrected Munitions Dispenser (WCMD) program was implemented to expand SFW employment options to reflect the change in air doctrine favoring high altitude releases. WCMD is an inertial guidance tail kit that replaces the existing tail section of current tactical munitions dispensers to improve delivery accuracy when released from medium to high altitude. The SFW with the WCMD is designated as a CBU-105.

In 1996, the Air Force instituted a Preplanned Product Improvement (P3I) program which implements three major improvements: (1) performance against countermeasures; (2) performance against softer targets without degrading the current target-set performance; and (3) increased area coverage. The current sensor will be upgraded from passive-only to a dual-mode active passive type to enhance the sensor's performance against cooler targets and improve weapon aimpoint. The Sensor Fuzed Weapon P3I submunition is designated a BLU-108B/B and the "all-up-round" is designated the CBU-97B/B, and CBU-105B/B with the WCMD tail kit.

Producibility Enhancement Program (PEP) hardware upgrades were initiated for SFW to reduce costs and improve producibility through design improvement. PEP-1 involved electronic and mechanical changes to the projectile. FOT&E 1 of PEP-1 was completed in 1998 and testing results indicated that PEP-1 changes did not degrade the performance of the Sensor Fuzed Weapon. The Sensor Fuzed Weapon TEMP was updated and approved in August 2000 to reflect the changes in the test program.

The LFT&E strategy for SFW P3I included: (1) collection of sensor data against a representative target set to determine impact points; (2) warhead performance data against armor plate targets; (3) three test shots that repeated shotlines from the original SFW testing in 1990; and (4) two additional tower shots. The SFW TEMP specifies that LFT&E for the SFW P3I must be completed before the FRP-7 contract award, scheduled for March 2002.

SAF/AQ approved production of the SFW P3I In January 2001. WCMD Milestone III was approved in February 2001. No further acquisition milestones are planned for SFW.

TEST & EVALUATION ACTIVITY

Sensor Fuzed Weapon P3I DT/OT flight test weapon deliveries were completed in May 2001 using operationally representative delivery profiles, including WCMD. The final DT/OT mission, a high altitude cold soak mission, was considered a No Test due to a failure not related to the SFW P3I. Since DT/OT depleted the inventory of P3I hardware manufactured to date, this mission will be repeated when additional P3I assets are available for FOT&E III, end-to-end testing of the P3I configuration planned to begin FY02 using the first production weapons.

SFW P3I warhead characterization testing was completed in late 2000. Warheads were fired against rolled homogeneous armor plates of various thicknesses, including semi-infinite plates. Data were gathered on the flight characteristics of the central penetrator and multiple explosively formed penetrators (MEFPs). Terminal ballistic data included penetration depth, crater volume, hole diameter and behind armor debris characterization. Also recorded were dispersion and shape of the EFP and pattern of the MEFPs. Since P3I data was comparable to performance data for the SFW baseline warhead, Phase I tower testing against realistic targets proceeded.

Phase I tower testing was conducted with SFW P3I warheads fired from a tower. The azimuth, elevation, and slant range to the target were representative of likely tactical engagement scenarios. Three Phase I test events were conducted. Shotlines were designed to duplicate, as much as possible, shotlines from SFW baseline testing in order to facilitate direct comparison of results with those from the baseline tests. The Phase I shots were completed in December 2000. Phase II shots were conducted in August/September 2001.

TEST & EVALUATION ASSESSMENT

Delays in the P3I submunition development affected the planned cut-in date for P3I into the Sensor Fuzed Weapon and will result in the procurement of fewer P3I versions of these weapons than originally planned. The P3I cut-in acquisition decision was based on preliminary results through nearly 90 percent of combined DT/OT. The final DT/OT mission and analysis of the data were not complete and the results of Phase I tower shots, although not Acquisition Decision Memorandum criteria, were not complete. Subsequent analysis of DT/OT showed notable effectiveness improvements over baseline weapons. A complete analysis of end-to-end operational effectiveness and suitability will be conducted following FOT&E III.

Previous operational testing of the Wind Corrected Munitions Dispenser demonstrated additional Sensor Fuzed Weapon employment capability from medium and high altitudes. SFW P3I confirmed these results, including interoperability with the B-52H with corrections for weapon built-in-test failures and a lack of display of weapon status previously reported, with the exception of a high altitude cold soak mission. Air Combat Command and AFOTEC recommended end-to-end test weapon releases with corrections, including the high altitude cold soak mission, before release to operational B-52 units. FOT&E III results will be used to determine effectiveness and suitability of the P3I weapons.

Warhead characterization testing had two primary objectives. First, provide fundamental warhead performance data to characterize warhead performance and provide for direct comparison with the baseline warhead. Second, provide sufficient empirical performance data to support updating the Point Burst Damage Assessment Model (PDAM) for use in future performance evaluation and scoring operational weapons test events. A review of the preliminary test data revealed the objectives were successfully achieved in characterization testing, and the program proceeded to Phase I tower tests. Final test reporting of the characterization test data has not been completed and will be included in the LFT&E report.

Phase I tower testing was conducted in accordance with the approved detailed test plan. Inherent angular errors in aiming the static warhead, combined with the substantially increased slant range (compared to the baseline test configuration), resulted in larger than anticipated errors between aim and impact point in the Phase I tests. Despite these errors, the major objectives of the Phase I tests were accomplished. Review of the preliminary damage assessments indicated that further tests against the Phase I targets were unlikely to contribute to assessment of: (1) lethality of the warhead against wheeled light armored targets, (2) performance of the MEFPs against light armored targets, and (3) reaction of stowed munitions and energetic materials to behind armor debris and MEFP impacts. This and warfighter requests to investigate performance against certain other targets led to the selection of an alternative target vehicle for Phase II.

Phase II tests were conducted to expand the data for LFT&E and support the warfighter requests. The major objectives of the Phase II tests were accomplished and contributed significantly to a broader understanding of SFW P3I lethality against the spectrum of expected targets. No consolidated report of characterization testing, Phase I, or Phase II test results have been provided yet and analysis is ongoing. A separate LFT&E report will be submitted once analysis is complete.

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